Pre-medication with I.V. dexmedetomidine Vs I.V. clonidine in attenuating the pressor response during laryngoscopy & endotracheal intubation

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Abstract

Aim of study: This randomized prospective study is done to compare the effects of single premedication dose of I.V dexmedetomidine with IV clonidine in attenuating pressor response to laryngoscopy & endotracheal intubation.

Method: Patients were randomly divided into 2 groups of 30 each. Group I patients received clonidine 3 µg/kg and Group II patients received Dexmedetomidine 1microgm/kg in 100ml NS 10 min before induction. HR (Heart Rate), SBP (Systolic blood pressure), DBP (Diastolic BP), MAP (Mean Arterial Pressure) were monitored at T₀,T₁,T₂,T₃,T₄ respectively. Patients were maintained with O₂, N₂O, Isoflurane and vecuronium at titrated doses.

Results: In both the groups patients had attenuation of sympathetic response with decrease in HR and BP. At 1 min and 3 min after Intubation rise in HR was more in clonidine group which is statistically significant (p < 0.01). Fall in BP was comparable with both groups, after administering the study drug and at induction. At 1, 3, 5, 10 min after intubation both groups showed suppression of SBP, DBP, MAP (p>0.05) There was increase in HR in both the groups at 1, 3, 5, 10 min after intubation but increase in HR was more in clonidine group which is statistically significant (p<0.01).

Conclusion: From this study we conclude that both clonidine and dexmedetomidine attenuates the pressor response during laryngoscopy and Intubation but Dexmedetomidine is better in attenuating the tachycardia response.

Keywords: clonidine; dexmedetomidine; pressor response

1. Introduction

Since the time of introduction of Endotracheal anaesthesia in the last quarter of 19th century endotracheal intubation has become one of the frequently performed procedures in the practice of anaesthesia. Endotracheal intubation is the translaryngeal placement of a tube into the trachea via the nose or mouth. Endotracheal intubation includes laryngoscopy & intubation. The process of laryngoscopy & intubation are noxious stimuli & therefore constitute a period of extreme haemodynamic stress and is associated with intense sympathetic activity marked by tachycardia & hypertension. Herein lays the rationale to continue the quest for an anaesthetic technique where the cardiovascular response can be attenuated. This has drawn the attention of many anaesthetists over the last forty years. Various pharmacological & non – pharmacological methods have been used to attenuate the haemodynamic response to laryngoscopy & endotracheal intubation. The non - pharmacological methods like smooth & gentle intubation with a shorter duration of laryngoscopy, insertion of LMA in place of endotracheal intubation & blocking Glossopharyngeal & superior laryngeal nerves have been used to attenuate the cardiovascular response to laryngoscopy & endotracheal intubation.

Pharmacological methods like use of Inhatalional anaesthetics, pre-treatment with I.V. lidocaine, narcotics, topical anaesthesia, β-blockers, calcium channel blockers, ACE inhibitors, vasodilators etc have been used. None of the above approaches or agents has proved to be ideal. Hence the search for an ideal agent to attenuate the hemodynamic responses is still continuing. Clonidine a centrally acting alpha-2 agonist has a beneficial effect on the hyperdynamic response to endotracheal intubation. More-over it attenuates stress induced sympathoadrenal response to painful stimuli, improves the intra-operative hemodynamic stability, reduces the incidence of peri-operative MI episodes in patients with suspected or documented coronary artery disease & decreases anaesthetic requirements during surgery; So clonidine seems well suit as premedication for attenuating hemodynamic response following laryngoscopy & intubation.

Dexmedetomidine is a highly selective, specific & potent alpha- 2 adrenergic agonist. Compared to clonidine it is said to be 7-10 times more alpha- 2 selective & has a shorter duration of action than clonidine. Pre-treatment with dexmedetomidine attenuates hemodynamic response to tracheal intubation. This study was performed to compare the effects of recently introduced drug dexmedetomidine & already used drug clonidine in attenuating pressor response during Laryngoscopy & Endotracheal intubation.

1.1 Aim

This randomized prospective study was done to compare the effects of single premedication dose of I.V dexmedetomidine with I.V. clonidine in attenuating pressor response to laryngoscopy & endotracheal intubation.

2. Materials and Methods

In this study, 60 patients in the age group 20-40yrs, of either sex belonging to ASA grade I & II scheduled for elective procedures under GA was included. The study was done in K.V.G Medical College, Sullia in between December 2013 to May 2014.

Patients with anticipated difficult airway, Hiatus hernia, GERD, BMI>30,patients on antihypertensive drugs, Patients on sedatives, hypnotics & antidepressants, H/O cardiovascular, respiratory, hepatic, renal diseases, Laryngoscopy time > 30 sec, Patients with ASA grade III & above, Endocrine diseases, Malnourished were excluded.

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2.1 Pre-Anaesthetic assessment
All patients were evaluated for fitness for anaesthesia on the day prior to surgery. Clinical examination of the patient was performed including General Physical Examination & systemic examination. All patients were explained about the anaesthesia technique & informed consent taken. Patients were kept NPO for 8hrs prior to surgery.

2.2 Pre - Medication
All patients were given tablet Diazepam 5mg orally at bed time on the previous night of surgery & 5mg orally in the morning, on the day of surgery.

2.3 Technique of anaesthesia
60 patients aged between 20 to 40 yrs belonging to ASA grade I & II were randomly divided into 2 groups, each group consists of 30 patients.

Group I [Dexmedetomidine group],
Group II [Clonidine group]

Basal systolic blood pressure, diastolic blood pressure, Mean arterial pressure, heart rate, ECG & SpO2 monitor were recorded (T0). Continuous monitoring of the vital parameters done. An Intravenous line was secured with an appropriate sized canula in all patients & preloading with 500ml of Ringer lactate over 30mins was done.

Group I [Dexmedetomidine group ] received Intravenous dexmedetomidine 1µg per kg in 100ml normal saline infused over 10mins34,5,6,7,8,9.

Group II [Clonidine group] received Intravenous clonidine 3µg per kg 100ml normal saline infused over 10mins10.

After 5mins stabilizing period SBP, DBP, MAP, Heart rate, SpO2 (T1) was recorded. Prior to induction, Inj Glycopyrrolate 0.2mg, Inj Ondansetron 4mg, & Inj Esomeprazole 40mg was administered IV. All patients were pre- Oxygenated for 3 mins & Anaesthesia induced with Thiopentone sodium 5mg / kg [2.5%] & Vecuronium 0.1mg / kg to facilitate laryngoscopy & intubation. Oxygenation continued by positive pressure mask ventilation using Bains circuit. 2mins after induction, SBP, DBP, MAP, Heart rate & SpO2 were recorded.

At the onset of apnoea, using laryngoscope with a Macintosh blade intubation was done with well lubricated, appropriate size cuffed oral endotracheal tube. Laryngoscopy & intubation time will be kept minimum (15sec). SBP, DBP, MAP, Heart rate, SpO2 were recorded at 1 min (T2), 3min (T3), 5min (T5), & 10min (T6) after laryngoscopy & intubation.

<table>
<thead>
<tr>
<th>Sequence</th>
<th>SBP, DBP, MAP, Heart rate, SpO2 recording</th>
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<tbody>
<tr>
<td>Basal reading when the patient is shifted to OT</td>
<td>T0</td>
</tr>
<tr>
<td>At 5 min after infusion of dexmedetomidine /Clonidine</td>
<td>T1</td>
</tr>
<tr>
<td>At Induction (2min after sleep dose of Thiopentone sodium)</td>
<td>T2</td>
</tr>
<tr>
<td>At 1 min after intubation</td>
<td>T3</td>
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<tr>
<td>At 3min after intubation</td>
<td>T4</td>
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<tr>
<td>At 5min after intubation</td>
<td>T5</td>
</tr>
<tr>
<td>At 10min after intubation</td>
<td>T6</td>
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</table>

Surgery commenced at the end of 10min after laryngoscopy & intubation. No form of stimulus was applied during the study period. Anaesthesia continued with N2O, O2, Isoflurane & analgesics administered based on the requirements.

At the end of surgery, when patients have respiratory attempts, residual neuromuscular blockage was reversed with Inj Neostigmine & Atropine. Recovery assessed & extubation was done after thorough throat suction. After complete clinical recovery patients were shifted to post anaesthesia care unit; observed for 2 hrs for Nausea vomiting, Bradycardia, Hypotension, & Sedation.

2.4. Statistical method employed
Demographic data were analysed by student’s t test. Analysis of variance for repeated measures (ANOVA) was used to analyse changes over time. The statistical software SPSS version 16.0 was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc.

3. Results
Total of 60 patients were randomly assigned to receive either dexmedetomidine or clonidine. Patients in the 2 groups had similar demographic profile. None of the patients were excluded from the study. Baseline hemodynamic data were also similar in both the groups. After administration of the study drug, before surgery HR, SBP, DBP, MAP decreased in both the groups.

**Heart Rate:** On an average HR decreased by 10-12 beats (T1) in both the groups, Maximum decrease in HR in dexmedetomidine group was 30 beats and in clonidine 25 beats. At T3 (At 1 min after intubation) maximum increase in HR in dexmedetomidine group was 18 beats/min and in clonidine group was 25 beats/min. At T6 (At 3min after intubation) maximum increase in HR was 16 beats/min in dexmedetomidine group and 22 beats/min in clonidine group. HR response to intubation was higher in clonidine group when compared to dexmedetomidine group which was statically significant (p<0.001)

**BP:** On an average SBP, DBP and MAP decreased by 18-22 mmHg, 14-18mmHg, 14-16mmHg respectively (T1) in both the groups. There was slight increase in BP at intubation (T2) in both the groups (on an average SBP, DBP and MAP increased by 8-10 mmHg, 6-8 mmHg, 4-5 mmHg respectively) but it remained below the pre- induction values. At T6, T6, BP displayed a downward trend and that was comparable in both the groups.

HR, SBP, DBP MAP returned to preinduction values by 10 min of intubation. No side effects (Bradycardia, hypotension) were noted in both the groups.

Fig 1: HR, SBP, DBP MAP returned to preinduction values by 10 min of intubation
4. Discussion

Anaesthesia and surgery is associated with increased stress which manifests in the form of tachycardia, hypertension and increased sympathetic activity. Laryngoscopy and intubation are the stressful stimuli which results in increased catecholamine blood levels, tachycardia and hypertension. Many drugs and techniques have been used to reduce these stressful stimuli.

- Alpha 2 agonist clonidine and dexmedetomidine are such drugs that are being frequently used to modify this cardiovascular response. In this study we used clonidine 3 µg/kg and dexmedetomidine 1 µg/kg IV which caused reduction in hypertensive response of similar magnitude.

- Zalunardo et al, Altan et al., Ray et al. used 3 µg/kg of clonidine for attenuating hemodynamic response to tracheal intubation. Ferdi et al concluded that dexmedetomidine 1 µg/kg IV infusion given 10 to 15 mins prior to laryngoscopy attenuates the pressor response. Based on these studies we chose 3 µg/kg clonidine and 1 µg/kg dexmedetomidine in our study. After administration of the study drug (clonidine 3 µg/kg and dexmedetomidine 1 µg/kg) there was significant reduction in HR SBP, DBP and MAP that was comparable in both the groups. This fall in HR and BP is mainly by the centrally mediated sympatholytic effect of these drugs.

In our study during laryngoscopy and intubation HR, SBP, DBP, MAP increased in both the groups. The magnitude of increase in HR during laryngoscopy and intubation was higher in clonidine group when compared to dexmedetomidine group and this was statistically significant even at 3 min after intubation (T4).

- Thus our results demonstrated that dexmedetomidine and clonidine attenuates the hyperdynamic stress response during laryngoscopy and intubation in similar magnitude but the tachycardia response during laryngoscopy and intubation was better attenuated in the dexmedetomidine group. Hypotension and bradycardia are considered the major side effects of alpha 2 agonists but in our study we did not have any incidence of significant hypotension and bradycardia.

- Other side effects like dryness of mouth and sedation which is found during the use of alpha 2 agonists was found only in 5 patients (3 in clonidine and 2 in dexmedetomidine group) which did not require any intervention. There were no other serious adverse effects noted in our study.

5. Conclusion

From our study we conclude that both clonidine and dexmedetomidine are effective in attenuating the stress response during laryngoscopy and intubation but dexmedetomidine was more effective in attenuating the tachycardia response.

Limitations of the study

We conducted the study for initial 10 min after intubation. The intra operative requirements of anaesthetic agents were not monitored.

References

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